**Water Activities Can Increase Cardiorespiratory Endurance of PJKR Students at the Faculty of Health Sciences, Jenderal Soedirman University**

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**Abstract.**
A few games can be done in water as an effort to stimulate aquatic learning activities that have a PAIKEM principle ¹. Besides invasion games, water activities are very enjoyable and have a good impact on cardiorespiratory endurance if they are applied systematically and structurally. This research aims to determine that water activities can increase the cardiorespiratory endurance. This research is a Quasi Experimental research with one group pre-post-test research design, where treatment was given for 12 weeks. The population in this research are students who attend the aquatic learning course. There are two classes; A and B, with a total of 74 students. The sample was taken by purposive sampling. The total samples in this study are 42 students who has passed the inclusion and exclusion criteria. Inclusion: a). Male students b). Willing to follow the research process c). In the age 18-20 years old. Exclusion: Students who are physically healthy. The independent variable in this research is the water activities carried out before the process of aquatic learning, while the dependent variable is cardiorespiratory of male students. The data analysis passes the data normality test and paired T test. Based on the results of the paired sample t test, it can be obtained a value of t = -7,634 and significance = 0,000 <0,05. Therefore, it can be stated that there is a significant effect on water activities towards Cardiorespiratory Endurance. The model of water activities applied with the right composition can be one of methods to increase the cardiorespiratory endurance of PJKR male students.

**Keywords:** Water Activity, Cardiorespiratory, Endurance

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**Introduction**

The role of Physical Education is very important. It gives students the opportunity to be directly involved in various learning experiences through physical activities, plays, and sports. The motion experience that students get in Physical Education is an important contributor to increasing participation rates while being an important contributor to lifelong well-being and health ².PJKR students are students who are prepared to be a health and sports physical education teacher (one of the possible jobs). As an instructor in aquatic learning courses, lecturers are not only able to teach basic techniques in swimming, but they must also be able to manage learning to be interesting with the aim of creating active, innovative, creative, effective, and fun learning that certainly does not override the learning goals of each theme. Therefore, the method used emphasizes physical activity that allows students in a happy atmosphere, creates a social atmosphere that is good for children's development, builds self-confidence, and produces physical freshness and health ³. Water activity is a very pleasant activity and has a good impact on cardiovascular endurance if it is applied systematically and structurally. The cardiovascular enhancement can be affected by regular physical activities ⁴. According to ⁵ Bompa, an exercise that is carried out regularly will have a great influence on the body. Physical exercise with certain load will change the physiology of the body, which later will change the level of physical fitness. Water based game activities are very fun for anyone involved in these activities. In the lecture process, the lecturer provides an opportunity for each student to explore his ability to develop a game idea in the pool with scheduled
students’ names in each lecture. This activity is very fun because the students who give and follow the water game instructions are very enthusiastic. It can be seen from how they do not miss the game without seriousness in playing and laughing throughout the game. This is the effort of the lecturers in equipping students of physical education as future teachers who in time will teach aquatic materials. This effort is transformed into the development of water games with the aim that students are not afraid to join swimming lessons. A stimulation in the form of water activity is needed so that in the swimming learning process, the students are not afraid to be in the pool.

A public swimming pool is a general business that provides a place for swimming, recreation, and other services using clear water that has been processed according to Minister of Health Regulation Number 416 / Menkes / Per / IX / 1990 which states that swimming pool water requirements include physical requirements, chemical requirements, and microbiology. There are several principles related to swimming pools, of which we can see in the following description:

a. Controlling impurities or infective materials which fall into the pool by: 1) Cleanliness with individual hygiene of swimmers is necessary noticed. 2) The construction design of the swimming pool is right and can block water contamination from dirty water, dust, garbage, and leaves around the pool. b. Removing any impurities and infective materials which fall into the pool as soon as possible by: 1) Continuous disinfection to help and maintain swimming pool conditions that meet the requirements. 2) Proper recirculation and filtering which will maintain water condition that meets the requirements. c. Maintaining proper construction and operation of the swimming pool by: 1) Guaranteeing pool equipment and supplies. 2) Always watching swimmers at all times. 3) Controlling or restricting number of swimmers.

According to PJKR students from the General Soedirman University, Faculty of Health Sciences conduct water activities in Langen Tirto swimming pool with a magnificent panoramic view of Slamet Mountain (in central Java). The water sources are abundant, so that in the pool treatment, the water every week is replaced with new water. The change of a lot of water every week makes this swimming pool known for its fresh water and no stinging chlorine (Ca (OC12).

Endurance (endurance) is the ability to do work within a long period of time. Endurance is always closely related to the length of work (duration) and the intensity of work. The longer the duration of the exercise, the higher the intensity of the work that can be done by a sportsman. It means he has a good endurance. There are two types of endurance, namely: a) aerobic endurance which is the ability to do work for a long time and the body needs O2 in the energy formation, b) anaerobic endurance which is the ability to do work for a long time but the body does not need O2 in the energy formation.

Cardiorespiratory endurance is influenced by several factors, including heredity (genetic), age, gender, and physical activities:

1) Heredity (genetic) The research that has been done is concluded that 93.4% of VO2max ability is determined by genetic factors that can only be changed with training. Genetic factors play a role in distinguishing the capacity of the heart, lungs, blood cells and hemoglobin, and also the percentage of slow twitch fiber.

2) Age. Age affects almost all components of physical fitness. Endurance (cardiovascular) shows a tendency to increase in childhood up to about twenty years old and will reach maximum at the age of 20-30 years old later. Endurance varies inversely with age, so that people who are 70 years old obtain 50% less endurance from what he had at the age of 17 years.

3) Gender; until the age of puberty, there is no difference in heart endurance (cardiovascular) of male and female. After puberty, the value in women is 15-25% lower than men. This difference is caused by the maximum difference of muscular power which is related to the surface area of the body, body composition, muscle strength, hemoglobin amount, lung capacity etc.

4) Physical activities. Physical activities greatly affect all components of physical fitness. The effects of aerobic exercise for 8 weeks after resting show an increase in the heart endurance (cardiovascular).

Methods

This research is Quasi Experimental with one group pre-post-test research design, where treatment was given for 12 weeks. The population in this research is students who attend the aquatic learning course. There are two classes; A and B, with a total of 74 students. The sample was taken by purposive sampling. The total samples in this study are 42 students who have passed the inclusion and exclusion criteria. Inclusion: a) Male students. b) Willing to follow the research process to completion c). In the age 18-20 years old. Exclusion: Students who are physically healthy. The independent variable in this research is the water activities carried out before the process of aquatic learning, while the dependent variable is cardiovascular ability of male students. The analysis passes the data normality test and paired T test.
Results and discussions

The normality test needs to be done to prove the assumption that the analyzed data for each variable is based on normal distribution. The acquisition of significance exceeds 5% or 0.05. It proves that these data have similarities. The significance obtained in the pre-test normality test is 0.861.

<table>
<thead>
<tr>
<th>Table 1. The Results of the data normality pre-test</th>
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<td>Statistic</td>
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<td>Pre_Test_Vo2</td>
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<td>Max</td>
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<th>Table 2. The Result of the data normality post-test</th>
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<tr>
<td>Statistic</td>
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<tr>
<td>Post_Test_Vo2</td>
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<td>Max</td>
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The acquisition of significance exceeds 5% or 0.05. It proves that these data have similarities. The significance obtained in the pre-test normality test is 0.441.

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<th>Table 3. The Result of Paired T Test (n=42)</th>
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<td>Paired Differences</td>
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<td>Pre_Post_Test_Vo2Max</td>
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Based on the results of the paired sample t test, it can be obtained a value of t = -7.634 and significance = 0.000 <0.05. It can be stated that there is a significant effect on water activities toward Cardiorespiratory Endurance. The effectiveness of the enhancements obtained from this study is N gain value = 0.304909 (moderate increase category).

The effectiveness results in the medium category because the ability of cardiorespiratory resistance with structured treatment and programs can obtain maximum results if it is applied for ages 20-30 years. This is as stated in the 2000 Ministry of National Education book that cardiorespiratory resistance will reach a maximum at the age of 20-30 years old.

The treatment of water activity for male students in the PJKR study program caused an increase in cardiorespiratory endurance after they were treated 12 times. The physiological response of structured water activities can increase oxygen distribution to parts of the body in need. It is also proven to increase the body's ability to carry out intense and continuous physical activities.
Conclusions

Water activity is an effort to promote pleasant water introduction which can provide stimulus to students before they practice the next material in the lecture on aquatic lesson. Water activities affect the students who are research samples. Their cardiorespiratory abilities increase with the N gain value = 0.304909 (moderate increase category).

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References